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EXAMINATION OF THE WIDESPREADNESS AND THREAT OF URINARY SCHISTOSOMIASIS AMIDST SECONDARY SCHOOL STUDENTS IN CHIKUN LOCAL GOVERNMENT AREA OF KADUNA SOUTH, KADUNA STATE

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Abstract

With over 75 percent of cases occurring in sub-Saharan Africa, *Schistosoma haematobium* infection is a parasite disease that affects over 100 million people globally. This study set out to determine how common urinary schistosomiasis is among kids in Chikun Local Government Area, Kaduna state, and what variables put them at risk for contracting the disease. Students from rural government secondary schools and children from rural areas of the local government had the highest frequency,

Introduction

The neglected tropical disease of urinary schistosomiasis, caused by the parasite trematode Schistosoma haematobium, affects millions of people worldwide, especially in sub-Saharan Africa. Children of school age are particularly vulnerable to the devastating effects of this illness on their health and quality of life. Secondary school pupils in Kaduna State, Nigeria,

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at 26.7%. There was an increased incidence of infection among children and adolescents aged 6 to 14. Schistosomiasis is more common among students whose homes and schools lack access to safe drinking water, and among students whose water comes from streams, the prevalence rate is much higher. Social and economic progress in the state and nation are affected by this disease's effects on children. The study takes a multipronged strategy to tackling these issues, including health education, extensive treatment, and environmental safeguards. For the community to effectively control and prevent urinary schistosomiasis, such all-encompassing approaches are crucial.

Keywords: Prevalence, Urinary Schistosomiasis, Students, Kaduna State, Government secondary school

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are disproportionately affected by urinary schistosomiasis, a serious public health concern. About seventy-seven developing nations in the tropics and subtropics face the serious health problem of schistosomiasis, a disease caused by the blood trematode worms of the genus Schistosoma. Nearly 700 million individuals are at danger of contracting the virus, and over 240 million are already infected. Nearly 300,000 people die each year from the disease, with over 90% of cases happening in sub-Saharan Africa (Hotez and Kamath, 2009). Disease has a disproportionately harmful effect on the health and academic performance of young people, including those in school and just entering adulthood. In endemic places, untreated diseases have a multiplicative effect: they cripple people and impede social and economic growth. Hematuria, dysuria, damage to the bladder wall, hydronephrosis, and squamous cell carcinoma are symptoms of urogenital schistosomiasis, which is mostly caused by Schistosoma haematobium. In adults, it can develop sores and ulcers in the vaginal

area, which can lead to problems with the reproductive system, such as impotence and sexual dysfunction. Symptoms of intestinal schistosomiasis, which is caused by Schistosoma mansoni, include intestine ulcers and bloody diarrhoea. Hepatomegaly, periportal liver fibrosis, portal hypertension, and hematemesis are the results of persistent infections. An additional species, Schistosoma intercalatum, is responsible for a specific kind of intestinal schistosomiasis that is exclusive to Central and West Africa (Tchuem et al., 2003).

Finding high-burden locations, gauging knowledge and awareness of the disease, and understanding risk factors for transmission are the goals of this study, which also seeks to examine the prevalence and threat of urinary schistosomiasis in this particular community. Insights into the local environment and support for evidence-based measures for disease control and prevention are the goals of the study. The study's overarching goal is to add to the ongoing conversation about schistosomiasis control in Nigeria by shedding light on the effects of the disease on the well-being and academic performance of Kaduna State's secondary school pupils.

Human schistosomiasis as bilharziasis due to Schistosoma haematobium

In tropical and subtropical regions, human schistosomiasis (bilharziasis) caused by Schistosoma haematobium is a public health and socioeconomic concern second only to malaria. People living in rural areas are particularly vulnerable to this disease because it is the most prevalent water-borne illness (Biu et al., 2000). In 56% of cases, the calcifications in the bladder are caused by schistosomiasis, making it a global problem. Cancer of the bladder's squamous cells is the worst possible consequence of urinary schistosomiasis. People living in areas with few resources in Nigeria have been hit the worst by this disease.

About 20% of sub-Saharan Africans live in Nigeria, making it one of the countries hit hardest by schistosomiasis in the past (Njepuome et al., 2009). Both natural and man-made bodies of water are most impacted by infections that disproportionately strike young people, particularly those between the ages of eleven and fifteen (Sarkinfada et al., 2009; McManus et al., 2011; Duwa and Oyeyi, 2009).

Urinary Schistosomiasis as a Parasitic Disease

Urinary schistosomiasis is prevalent in almost all rural regions of Nigeria, mostly due to extensive ecological and socio-economic causes (Umoh et al., 2020). Schistosomiasis, a parasitic disease, occurs in the tropics and sub-tropics due to the infestation of people by Schistosoma haematobium, a type of parasitic flatworm. Urinary schistosomiasis, although easily preventable, is the second most prevalent parasite disease, following malaria. It has substantial socio-economic consequences in the affected areas (CDC 2011, WHO 2013, Kazibwe et al., 2006). Urinary schistosomiasis is a significant global public health issue, affecting approximately 779 million individuals as of 2008 (Hotez, 2009). In 2010, Nigeria had the largest number of reported cases of roughly 29 million, and around 101 million people were at risk of infection (Hotez et al., 2012, WHO 2013). The high prevalence in Nigeria is attributed to the extensive distribution of Bulinus spp., which serves as the snail host for S. haematobium, and the uncontrolled discharge of urine containing S. haematobium eggs into water bodies where the snail host is found (Okolie, 2008). The high prevalence of urinary schistosomiasis in underdeveloped countries can be attributed to factors such as inadequate sanitation, poverty, lack of awareness, restricted healthcare access, and insufficient social amenities (WHO

2016). Human infection occurs when individuals come into contact with water containing the infective stage of the parasites, called free-swimming cercariae, which can enter the softened, unbroken skin during activities like fishing, laundry, bathing, and swimming. Intermediate snail hosts and heightened human connection with infected water bodies are vital elements that facilitate the propagation of the disease. Children, because of their inclination to engage in aquatic activities, are more vulnerable to urinary schistosomiasis (WHO 2008). Timely identification is crucial for the management and prevention of diseases, with praziquantel therapy being a pivotal intervention (WHO 2012). Parasitological diagnosis, which entails using a microscope to examine urine for parasite eggs, is a practical and commonly employed method. On the other hand, immunoserological diagnosis, which involves detecting parasite antigens and antibodies using techniques like enzyme-linked immunosorbent assay, is particularly effective, especially in detecting early infections. Urinary schistosomiasis inquiry in endemic populations should focus on school-age children, as they are more susceptible to the disease due to their poor hygiene practices and engagement in water-related activities, which promote the transmission of parasites. The inclusion of this age group in mass treatment programmes and the identification of intervention requirements can be justified by the useful data they provide. Urinary schistosomiasis is a significant public health problem in certain areas in Ebonyi State, located in southeast Nigeria. This highlights the importance of implementing contemporary measures for prevention and control (Uneke et al., 2006). This study evaluates the frequency and determinants in rural communities in the area, with the goal of offering an up-to-date plan for successful approaches.

Examination of the widespreadness and threat of Urinary Schistosomiasis in Rural and Urban Communities

Urinary schistosomiasis is quite prevalent in Nigeria, affecting both rural and urban regions. The incidence rates vary widely, ranging from 2% to 90%. This disease mostly affects underprivileged and marginalised groups. This illness has been documented in all 36 states, including the Federal Capital Territory. The high occurrence of this disease is frequently associated with water resource development initiatives like dams and irrigation systems, as well as with bodies of water that have slow currents or are stagnant, which provide ideal circumstances for the breeding and survival of the snail intermediate host. Individuals residing in close proximity to these water initiatives or those who regularly come into contact with polluted water are at a heightened susceptibility to infection, specifically school-aged children. Worldwide, schistosomiasis impacts almost 200 million individuals, leading to the loss of roughly 1.532 million disability-adjusted life years (DALYs) each year, with 77% of these cases occurring in sub-Saharan Africa (Lopez et al., 2006). Efforts to manage the disease are frequently responsive, prompted by the occurrence of clusters of cases. Research in Kaduna State, Nigeria, focuses on comprehending the disease burden of schistosomiasis, which is a major public health concern. The research intends to investigate the prevalence, distribution, and specific risk factors associated with the disease. This information is vital for the development of precise interventions, such as mass drug administration campaigns, snail control programmes, and health education activities. Evaluating the efficacy of current control techniques and identifying novel strategies for eradicating diseases are also primary objectives of

research. The primary objective of this project is to enhance public health outcomes and advance the eradication of schistosomiasis in Nigeria. Tackling the underlying factors of the disease necessitates a holistic strategy that extends beyond the confines of the healthcare profession. State governments should actively participate in socioeconomic development activities, such as reducing poverty, increasing educational opportunities, boosting nutrition, and empowering local communities. These endeavours contribute to improved health results and decrease the total burden of disease in impacted areas.

Schistosomiasis is a chronic and severe tropical disease

Schistosomiasis is a persistent and incapacitating neglected tropical disease caused by waterborne parasitic flatworms of the genus Schistosoma. Notable species from a medical perspective are Schistosoma haematobium, S. mansoni, S. japonicum, S. mekongi, S. guineensis, and S. intercalatum (Balogun et al., 2022), with the primary global health issues being associated with the first three. Male and female schistosomes, which are fully grown individuals, live in the blood system. In particular, S. haematobium resides in the vesical venous plexus of the bladder, while S. mansoni and S. japonicum inhabit the mesenteric veins of the gastrointestinal tract. Female worms that have mated deposit eggs in these specific places, which are subsequently eliminated through urine or faeces into the surrounding environment (Nation et al., 2020). Within freshwater environments, the eggs undergo hatching, leading to the liberation of miracidia that infiltrate intermediary snail hosts. The snail undergoes asexual reproduction, resulting in the formation of sporocysts, which eventually give rise to

cercariae. When exposed to sunlight, cercariae are released into the water, enter human skin, and settle in the systemic circulation as schistosomula. The process of maturation in the liver leads to the development of adult worms that reside in blood arteries near the bladder or intestines, thus continuing the cycle (Gryseels et al., 2006; McManus et al., 2018).

Schistosoma haematobium is responsible for urogenital schistosomiasis (UgS), while Schistosoma mansoni and Schistosoma japonicum cause intestinal schistosomiasis (IS). Both kinds can result in long-lasting and incapacitating health problems, which might potentially result in diminished self-confidence and social marginalisation. Urogenital schistosomiasis (UgS) is linked to the presence of blood in urine in both children and adults, blood in semen and painful ejaculation in adult males, and atypical vaginal discharges and pelvic discomfort in females (Abdel-Naser et al., 2019; Colley et al., 2014; Kjetland et al., 2012; Zida et al., 2016). UgS and IS present significant public health issues, impacting more than 230 million individuals in 54 tropical and sub-tropical countries, mainly in rural areas (Amuta and Houmsou, 2014). This results in an estimated loss of 1.4 million DALYs (GBD 2017 DALYs and HALE Collaborators). Nigeria has the greatest prevalence of schistosomiasis worldwide, with over 25 million people afflicted. The primary form of the disease in Nigeria is UgS (Ekpo et al., 2013). The earliest recorded instance of schistosomiasis in Nigeria dates back to 1881 in the former Borno Empire, which is now part of Borno State. Since then, the disease has spread extensively throughout the country, with various levels of occurrence in different districts (Ezeh et al., 2019). The frequency of the disease in Nigeria may be increasing despite the implementation of mass chemotherapeutic programmes using praziquantel (PZQ). This could be attributed to factors such as poverty, insufficient public health infrastructure, and poor levels of literacy (Ajakaye et al., 2016). Several communities, including those in Jigawa

State, have a lack of information regarding the prevalence or incidence of the disease, particularly among school-age children who are at a higher risk. This lack of knowledge presents a substantial challenge to activities aimed at controlling the disease. This study aims to explore the prevalence and risk factors of urinary schistosomiasis (UgS) among primary school kids in Jidawa and Zobiya, rural communities in Dutse Local Government Area of Jigawa State, Nigeria. These communities have not been previously studied for schistosomiasis. The selected towns for this study have a significant earth dam that serves many agricultural purposes such as irrigation, fishing, and supplying drinking water for livestock. The local residents also utilise the water from the dam for bathing and household needs, which exposes them to an increased likelihood of contracting diseases caused by waterborne bacteria found in the reservoir. Research suggests that the construction of agricultural dams is a significant factor in the widespread occurrence of schistosomiasis, as reported by Atalabi et al. (2016) and Lund et al. (2021). Bara et al. (2021) discovered a significant occurrence of urinary schistosomiasis among primary school students in the Kirfi Local Government Area of Bauchi State, Nigeria. The virus impacted individuals of both genders, across all age ranges, and throughout all educational institutions, with the largest occurrence observed among students attending schools in close proximity to the river. Schistosomiasis is a parasitic disease that occurs in tropical regions and is caused by blood-dwelling flukes belonging to the genus Schistosoma. This disease is a major public health issue in underdeveloped nations (Gryseels et al., 2006). Schistosomiasis is acknowledged by the World Health Organisation (WHO) as the second most economically and socially destructive parasitic illness in the world, following malaria. It affects hundreds of millions of people worldwide (WHO, 2006). Schistosomes, also known as blood-flukes, are a type of trematode that stand out because of their dioecious nature, which means they have

separate male and female individuals and show clear differences in physical characteristics between the two sexes.

Objectives of the Study

The purpose of this research is to examine the widespreadness and threat of urinary schistosomiasis and identify the risk factors associated with it among secondary school students in Chikun Local Government Area, Kaduna State. The specific objectives are:

1. To identify the socio-demographic and behavioral risk factors related to the transmission and infection of urinary schistosomiasis among the students.
2. To investigate the water contact habits of students, including activities that may expose them to schistosomiasis.
3. To assess the level of knowledge and awareness of urinary schistosomiasis among secondary school students.
4. To raise awareness among parents and the local community about the importance of preventing urinary schistosomiasis and the associated risk factors.

RESEARCH METHOD

Study Area

The study focuses on Chikun Local Government Area, which is situated in the northwestern part of Nigeria's Kaduna State and serves as the designated administrative region for this research. The geographic and demographic attributes of this area are expected to influence the occurrence and factors that increase the risk of urinary schistosomiasis. Based to the disputed 2019 population estimate from the National Bureau of Statistics, Kaduna State's population was recorded as 9,300,382. The state, which was founded in 1987, was created from the preexisting Kaduna State.

Study Design

This study is a retrospective analysis that uses a cross-sectional research design. It specifically examines secondary school students and children between the ages of 6 and 14 in the Chikun Local Government Area of Kaduna State. Schools were chosen at random from both the public and private sectors within the Chikun Local Government Area. The sample size was chosen using prevalence estimates, projected effect sizes, and statistical power considerations.

Data Administration

Data on participants was collected from the archives of specific hospitals, including the Federal Teaching Hospital Kaduna. The collected data encompassed variables such as age, schistosomiasis test outcomes, place of residence, and exposure to freshwater, among other factors.

Statistical Analysis

The data was inputted into Microsoft Excel and subsequently imported into the Statistical Package for the Social Sciences (SPSS) version 23.0 for the purpose of analysis. Demographic data was summarised using descriptive analysis, and the correlations between risk factors and schistosomiasis prevalence were assessed using inferential analysis, specifically logistic regression.

Ethical Considerations

Various ethical considerations, such as the protection of privacy and the requirement for informed consent, had an impact on specific elements of the research approach. Prior to the commencement of the research,

the researchers acquired approval and ethical clearance from the Federal Teaching Hospital Kaduna.

RESULT AND DISCUSSION

Table 1. Demographic profile of the respondents

Age of the children	Frequency	Percentage
6-10	56	48.3%
11-14	60	51.7%
Total	116	100%
Socio-economic status		
Low	7	6%
Middle	78	67.2%
High	31	26.7%
Total	116	100%
Result Schistosomiasis test		
Negative	85	73.3%
Positive	31	26.7%
Total	116	100.0
Contact with fresh water		
Yes	33	28.4%
No	83	71.6%
Total	116	100.0%

The obtained personal data of the recruited children for the research included their age, socio-economic level, schistosomiasis test results, and the nature of their contact with fresh water in their individual contexts.

Table 1 indicates that there was a somewhat greater percentage of pupils between the ages of 6 and 10 (51.7%) who were included, in comparison to those between the ages of 11 and 14 (48.3%). The distribution of age groups among the secondary school pupils in Chikun

Local Government Area appears to be quite even and representative. Comprehending the age distribution is essential for evaluating the susceptibility of various age groups to urinary schistosomiasis, as vulnerability and exposure may differ during different phases of development. In terms of socio-economic position, the majority of students were categorised as middle class (67.2%), with a smaller proportion coming from low socio-economic origins (26.7%), while just a small fraction belonged to high socio-economic status (6.0%). The distribution of students within the study population emphasises the prevalence of students from middle-class backgrounds. The socio-economic position has a substantial influence on the availability of healthcare, sanitary facilities, and education, all of which have a role in determining the likelihood of contracting and effectively managing urinary Schistosomiasis. The examination of the Schistosomiasis test results in table 1 indicates that 26.7% of the students were found to have the disease, whilst 73.3% tested negative. This discovery highlights the substantial impact of urinary schistosomiasis on secondary school students in the Chikun Local Government Area.

Table 2. Adequacy of sanitation facility and Access to safe water

Adequacy of sanitation facility	Frequency	Percentage
Inadequate	91	78.4%
Adequate	25	21.6%
Total	116	100.0%
Access to safe water		
Limited	26	22.4%
Unlimited	90	77.6%
Total	116	100.0%

Table 2 presents data on the sanitary facilities available to secondary school students and children in Chikun Local Government Area. The data reveals a worrisome pattern, since the majority (78.4%) reported insufficient sanitation facilities. This indicates an absence of adequate sanitary infrastructure, which can have substantial consequences for cleanliness and the spread of diseases. Insufficient sanitation facilities heighten the likelihood of water sources becoming contaminated with disease-causing microorganisms, particularly those that cause urinary Schistosomiasis. In addition, inadequate sanitation can exacerbate the transmission of other waterborne illnesses and have adverse effects on public health outcomes. Ensuring access to clean water is another crucial factor in the prevention and management of urinary Schistosomiasis. Nevertheless, the data indicates that a significant percentage (22.4%) of the kids face restricted availability of clean water. Insufficient availability of healthy water sources might compel persons to depend on polluted water bodies, hence elevating their susceptibility to waterborne illnesses like Schistosomiasis. Enhancing the availability of clean water is crucial not just for reducing urinary Schistosomiasis but also for fostering the general health and well-being of students. The inequalities in access to sufficient sanitation facilities and clean water emphasise the necessity for focused interventions to tackle the fundamental factors contributing to urinary Schistosomiasis in the Chikun Local Government Area. The primary objective should be to enhance the sanitary infrastructure, guarantee access to secure water sources, and advocate for hygiene behaviours among students. Implementing sustainable solutions to lower the burden of urinary schistosomiasis and improve the health outcomes of the affected

population requires the involvement of community-based initiatives, public-private partnerships, and government actions.

Table 3. Classification table for weight effect of the total number of cases.

Logistic Regression

Case Processing Summary

Unweighted Cases[a]		N	Percent
	Included in Analysis	116	100.0
Selected Cases	Missing Cases	0	.0
	Total	116	100.0
Unselected Cases		0	.0
Total		116	100.0

Table 4a. Classification table for a Constant included in the model.

Classification Table[a,b]

Observed			Predicted		
			Result schistosomiasis test		Percentage Correct
			Negative	Positive	
Result schistosomiasis test		Negative	85	0	100.0
		Positive	31	0	.0
Overall Percentage					73.3

The cut value is .500

Table 4b. Variables in the Equation for the model. Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	-1.009	.210	23.111	1	.000	.365

Table 5. Variables not in the Equation of the model. Variable not in the equation

	Score	df	Sig.
Contact_with_fresh_water	49.843	1	.000
Adequacy_of_sanitation_facility	.026	1	.871
Variables Access_to_safe_water	16.412	1	.000
Season	5.202	1	.023
Immune_status	18.840	1	.000
Overall Statistics	64.722	5	.000

Table 6. Correlation Table of the model.

Correlations

	Result schistosomiasis test	Contact with fresh water	Adequency of sanitation facility	Access to safe water	Weather	Immune status
Pearson Correlation	1	-.656**	0.015	-.376**	-.212*	-.403**
Result schistosomiasis test Sig. (2-tailed)		0	0.872	0	0.022	0
N	116	116	116	116	116	116
Pearson Correlation	-.656**	1	-0.088	.303**	0.117	0.139
Contact with fresh water Sig. (2-tailed)	0		0.349	0.001	0.21	0.136
N	116	116	116	116	116	116
Pearson Correlation	0.015	-0.088	1	-0.02	-0.09	-0.013
Adequency of sanitation facility Sig. (2-tailed)	0.872	0.349		0.832	0.339	0.888
N	116	116	116	116	116	116
Pearson Correlation	-.376**	.303**	-0.02	1	0.061	.202*
Access to safe water Sig. (2-tailed)	0	0.001	0.832		0.517	0.029
N	116	116	116	116	116	116
Pearson Correlation	-.212*	0.117	-0.09	0.061	1	0.154
Weather Sig. (2-tailed)	0.022	0.21	0.339	0.517		0.099
N	116	116	116	116	116	116
Pearson Correlation	-.403**	0.139	-0.013	.202*	0.154	1

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Immune status Sig. (2-tailed)	0	0.136	0.888	0.029	0.099	
N	116	116	116	116	116	116

Correlation is significant at the 0.01 level (2-tailed).

Table 7. model summary for a Snell R Square Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	61.893[a]	.466	.679

Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 9. classification table for model summary for a Snell R Square Classification Tablea

	Observed		Predicted		
			Result schistosomiasis test		Percentage Correct
			Negative	Positive	
Step 1	Result schistosomiasis test	Negative	76	9	89.4
		Positive	7	24	77.4
	Overall Percentage				86.2

The cut value is .500

Analysis of Predictor Variables

Table 9 presents the estimated influence of each predictor variable on the probability (log odds) of testing positive for schistosomiasis. A negative coefficient signifies a decrease in the likelihood of obtaining a positive test result, whilst a positive coefficient signifies an increase. The standard deviation of the sampling distribution of the beta coefficient

indicates the level of accuracy of the computed coefficient. The Wald statistic is a measure used to test the null hypothesis that a coefficient is equal to zero. It is calculated by dividing the square of the coefficient by its variance. The degrees of freedom associated with the Wald statistic indicate the amount of different sources of information that can be used to estimate a parameter. Table 9 additionally displays the proportion of accurately categorised instances by the model, aiding in the evaluation of the model's importance and predictive capability, as well as the individual impacts of each predictor variable on the outcome. The objective of the logistic regression study was to uncover important predictors of urinary schistosomiasis among secondary school students in the Chikun Local Government Area. The model's overall statistical significance ($p < .500$) suggests that the included variables collectively possess predictive capability in determining schistosomiasis test results, emphasising the significance of comprehending these elements to develop focused therapies.

The analysis indicated substantial impacts from exposure to freshwater, availability of clean water, and immune system condition. Students who indicated lower exposure to freshwater, improved availability of clean water, and enhanced immunological status had a considerably reduced likelihood of testing positive for schistosomiasis. These findings highlight the crucial significance of water-related variables and immunological health in the transmission and vulnerability to diseases. Implementing measures to boost water quality, encourage hygienic practices, and strengthen immune health could effectively alleviate the prevalence of schistosomiasis among students. Nevertheless, the statistical analysis did not find any significant relationship between the adequacy of sanitation facilities, seasonal

fluctuations, and their ability to forecast the outcome in this model. Although these characteristics may still have an effect on the transmission of diseases, their significance may be eclipsed by water contact behaviour and immunological state in this particular situation. However, it is essential to prioritise the resolution of sanitation problems in order to safeguard public health as a whole and incorporate it into comprehensive approaches to manage urinary schistosomiasis.

Conclusion

The study highlights the considerable prevalence of urinary schistosomiasis among junior secondary school students and children living in Chikun Local Government Area. By conducting a thorough examination of the frequency and potential causes, numerous significant observations have been made. Our investigation revealed a high prevalence of urinary schistosomiasis among secondary school students and children in the region, with a significant number of individuals testing positive for the disease. This emphasises the immediate necessity for focused actions to manage its transmission and ease the distress of impacted persons.

Our research has also found other risk factors linked to the transmission of urinary schistosomiasis. These include regular exposure to polluted water sources, insufficient access to clean water and sanitation facilities, and limited information regarding the disease and its preventive measures. It is essential to implement multimodal interventions to address these risk factors in order to decrease the occurrence of urinary schistosomiasis in the community.

In addition, our geospatial analysis identified spatial clustering of urinary schistosomiasis patients specifically in the Chikun Local

Government Area, indicating the presence of localised transmission hotspots. Concentrating resources on these locations with a high risk of disease could optimise the effectiveness of control measures and result in more efficient disease management. To reduce the impact of urinary schistosomiasis on children's health and well-being in the Local Government Area, we may address the root causes of the disease and strengthen disease control measures. This will contribute to the general development of public health in the region.

RECOMMENDATION

Based on the analysis of results, several recommendations can be made to address the findings and mitigate the impact of the disease. Here are some possible recommendations to the stake holders:

1 Implement comprehensive health education programs in secondary schools and rural communities, aimed at increasing awareness about urinary schistosomiasis, its transmission routes, symptoms and preventive measures.
2 Stake holder should collaborate with local authorities to improve access to clean water sources and sanitation facilities in the Kaduna local community. Such as construction of boreholes, wells, and latrines, as well as the promotion of hygiene practices.
3 Establish regular screening and treatment programs for urinary schistosomiasis among secondary school students and children in collaboration with healthcare providers.
4 Implement vector control measures to reduce the population of snails, the intermediate hosts of Schistosoma parasites, in water bodies frequented by secondary school students.
5 Engage local communities through participatory approaches to

foster ownership and sustainability of interventions.

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